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XI.—THE FALKLAND ISLANDS.

FORESTRY. TUSSOCK GRASS.

W. DALLIMORE.

The records of the Royal Botanic Gardens, Kew, indicate that on several occasions between 1842 and the present date correspondence has taken place between the Governor of the Falkland Islands and other individuals, the Colonial Office, and the Director of the Royal Botanic Gardens, Kew, respecting trees suitable for experimental planting in the Islands, and the advisability of planting the Falkland Islands Tussock Grass extensively in certain parts of the British Isles; therefore, in view of recent interest shown in the two subjects, the following notes have been prepared.

FORESTRY.

In order that the difficulties which beset the islanders when considering the establishment of trees may be understood, it is necessary to give a few details respecting the geographical position of the islands and the prevailing physical and climatic conditions.

* They are situated in the South Atlantic Ocean, between 51° and 53° S. lat., and between 57° and 62° W. lon., about 480 miles N.E. of Cape Horn, and about 1000 miles due south of Monte Video. They consist of East Falkland (area 3000 square miles), West Falkland (2300 square miles), and about 100 small islands, with an area of nearly 1200 square miles. The surface is undulated with Mount Adam, the highest ground, rising to 2315 ft. above the level of the sea. The entire country is wild moorland with outcrops of rocks and wide stone runs which litter large areas of the valleys with stones. Much of the soil is peat, often of a wet and boggy nature. In other places it is loam or clay, and in some instances peat over-lies clay of such tenacity that natural drainage is almost impossible and the peat becomes semi-liquid. There are, however, areas

* Colonial Office List.

(448.) Wt. 158—829. 1,125. 7/19. J. T. & S., Ltd. G. 14. Sch. 1

of fertile soil suitable for potatoes, cabbages, turnips, oats and other agricultural crops, whilst various vegetables, currants, gooseberries and raspberries can be grown in sheltered gardens. Oats rarely ripen but are grown as a green fodder crop. There is naturally a great shortage of lime in the soil and agricultural lime cannot be easily obtained from other countries to correct the acidity of sour soil. Occasional movements of bog land on the hills and mountains take place, and in several instances such movements have caused the inhabitants a good deal of inconvenience.* The only roads in the islands are in the neighbourhood of Port Stanley, communication between the various points being by sea or on horseback.

The climate is severe but healthy, except for those predisposed to pulmonary affections. It is uniformly cold, the mean temperature being 42° Fahr. The thermometer ranges between 20° and 50° in winter, and between 40° and 65° in summer. The cold is intensified by constant high winds which prevail, especially in the summer, rising about 10 a.m. and falling away between 4 and 5 p.m. The annual rainfall seldom exceeds 25 in., though there are a good many wet or damp days, the number ranging between 220 and 240 a year. In the summer the atmosphere is remarkably dry, and evaporation is rapid. The population in 1915 was 3451,† the majority of the people being engaged in sheep farming or in seafaring industries.

The flora consists of herbaceous plants and shrubs. The largest bush is *Veronica elliptica*. A few plants approaching 7 ft. in height have been recorded from West Falkland, otherwise its average height is from 3 to 5 ft. *Chiliotrichum amelloideum* (Fachina), grows 3 to 4 ft. high and *Myrtus nummularia* is also prominent. The commonest shrub is the "Diddle-dee" (*Empetrum nigrum* var. *rubrum*), which is found from a prostrate plant to dense, rounded bushes 1 to 2 ft. high. A few of the other low-growing shrubs are *Pernettya empetrifolia* (*P. pumila*), *Gaultheria microphylla*, *Baccharis magellanica*, and *Veronica serpyllifolia*. *Poa flabellata*, Hook. f., the "Tussock" or "Tussac" Grass, a large-growing perennial at one time the most prominent feature of the shores but now scarce on the larger islands, is a valuable fodder plant, otherwise the natural vegetation is poor as fodder, and only carries one sheep to four acres.

The chief difficulties to encounter in forestry operations appear to be wind, wet, sour and badly drained ground, and apathy or lack of initiative and knowledge on the part of the inhabitants. But considering the difficulties that have been surmounted in other countries where successful forests have been established under what were equally disheartening conditions, there appears to be no good reason why the subject should not be given a proper trial, for in a place where natural trees do not exist, the establishment of woods of even moderate growth would be of great benefit to the islanders both from the shelter they would afford, and as a source of firewood and timber for fencing.

The general amenities of the Islands would also be much

* Kew Correspondence.

† Whitaker's Almanack, 1917.

improved should successful forests be established. From the time when the earliest emigrants entered the country the absence of trees appears to have made the greatest impression upon newcomers, and from the middle of last century successive Governors and a few of the more progressive settlers have considered the possibility of establishing trees either for ornament or profit. Planting schemes, usually of a very half-hearted character, have been suggested from time to time, but, whether from apathy, lack of general sympathy, or the disinclination to risk money on a project that could only be considered in the light of an experiment, they have not materialised, and the introduction of young trees or tree seeds has not gone beyond the individual efforts of a few settlers and a few attempts by Government officials to procure trees and shrubs for the garden at Government House. Unfortunately in the few efforts that have been made the persons interested have not possessed sufficient technical knowledge to enable them to give the young trees the special attention necessary to enable them to overcome the unfavourable conditions which prevail, neither have they made proper reports upon the behaviour of the various species tried, therefore the position has not altered from what it was when Col. Moody, the first Lieut.-Governor of the Islands, took office in 1842.

During that year the Ross Expedition wintered in the Islands and the Governor apparently became interested in plant life partly through the enthusiasm of Dr. (Sir Joseph) Hooker, one of the officers of the expedition. The first information we possess of trees and shrubs being introduced into the Islands is a *despatch from Governor Moody to Lord Stanley at the Colonial Office, dated 16th November, 1842, advising him that the Antarctic Expedition (Captain Ross) returning from St. Martin's Cove, Cape Horn, brought to the Colony 700 young trees, chiefly winter barks, beeches, and holly-leaved berberies, &c., and that the trees were immediately planted with hopes that they might succeed. We know nothing of the fate of those trees save that on 1st February, 1844, the Governor, in a letter to Sir William Hooker, reported that the elder trees and the Antarctic beeches in the graveyard were doing well.

The next information we have of trees and shrubs being sent to the Falklands is a list of plants forwarded from Kew on 27th December, 1848. The plants were:—*Arbutus Unedo, Aucuba japonica, Berberis Aquifolium, Betula alba* 2, *Buxus sempervirens* 2, *Colutea arborescens, Crataegus orientalis, C. Oxyacantha, Cytisus albus, C. scoparius* 2, *Elaeagnus orientalis* 2, *Euonymus japonicus, Fagus sylvatica, Garrya elliptica, Hedera Helix, Hippophae salicifolia* 2, *Ilex Aquifolium, Laburnum vulgare, Ligustrum vulgare, Picea alba, Pinus Laricio* 2, *P. montana* var. *Mughus* 2, *P. Pinaster* 2, *P. rigida* 2, *P. sylvestris* 4, *Platanus*? [*Ulmus*] *campestris, Platanus orientalis, Prunus Laurocerasus, P. lusitanica, Quercus pedunculata, Q. sessiliflora, Q.* sp., *Ribes alpinum* 2, *R. aureum, R. Menziesii, R. nigrum* 2, *R. sanguineum, Rosa* sp., *Salix Caprea,*

* Information respecting the Falkland Islands. Chas. Knight, 1843.

S. lanigera? Spartium junceum, Spiraea Lindleyana, Syringa vulgaris, Taxus baccata, T. b. var. *fastigiata, Thuya occidentalis, Tilia* sp., *Ulex europaeus* 4, *Vinca major, V. minor* and the following fruits:—Currant, white 6, Currant, red 6. Gooseberry 6 varieties, 12 plants, Raspberry, double bearing 6, R., Yellow Globe, 6, R., Fastolff 6, Blackberry (*Rubus fruticosus*). Whether these plants arrived safely and became established is unknown, but it appears likely that the plants of *Ulex europaeus* may have been the parents of the numerous Gorse plants now present in the Islands. The Laburnum is still to be found in one or two places.

Their introduction does not appear to have made much difference to the general aspect of the Islands, for in 1870 the Governor, Col. G. D'Arcy, wrote on 2nd May to Sir Joseph Hooker that "the people of the settlement are very industrious and very anxious to help themselves by raising vegetables, but the wind actually blows the seed out of the ground," and asking whether in his wide experience he could suggest any hardy tree or bush to make a fence. He added, "there is not a tree or bush on the islands of any kind." He had apparently overlooked the Veronica, and Sir J. Hooker suggested that he should try that.

In 1886, Mr. Arthur Barkly, recently returned from the Seychelles, relieved Governor Kerr for a year. After the luxuriant plant growth of those islands he was unfavourably impressed by the bareness of the Falklands, and during his term of office wrote to Kew for seeds or roots of any hardy bushes or shrubs that would be likely to thrive; he thought that they might be expected to grow 12 or 15 ft. high, and that evergreen bushes would greatly improve the appearance of the country. It is not very clear whether seeds were sent on this occasion but on 10th June, 1891, a letter was received at Kew from the Colonial Office saying that the Government of the Falkland Islands wished for a small supply of seeds and plants, and asking for the advice of the Director as to selection and packing. Seeds for indoor and outdoor cultivation were obtained from Messrs. Sutton and included Palms, Crotons, Caladiums, Magnolias, Laurestinus, Azalea, Arbutus, Roses and Hardy Ferns. A more comprehensive list of plants was sent, however, with the approximate price, apparently, for approval, but it appears to have been rejected on account of expense. The Governor, however, was determined to procure seeds, and the Colonial Secretary of the Falklands on his return home in 1891 was requested to approach Dr. (Sir Daniel) Morris regarding plants or seeds. In the end it was decided that an amount not exceeding £10 should be spent on seeds and plants, the amount to include packing. The order was executed by Messrs. Veitch, of Chelsea, and seeds of a variety of trees, including Pines, Birches, Poplars, etc., were sent on 17th January, 1893.

In 1893 Mr. Edward Rawlings wrote to Kew for advice respecting *Pinus insignis*, as his nephew, Mr. R. E. Nichol, was desirous of attempting a plantation in the Falkland Islands.

About 25 or 30 years ago Mr. Robert Blake, a prominent sheep farmer in the Falklands and now a Director of the Falk-

land Islands Company, made what was probably the most determined attempt that has yet been undertaken to establish a plantation of trees in the Islands. Unfortunately he left the Islands in 1898 and was thus unable to give the young trees personal attention. They, however, made fairly good progress and some reached the height of 30 ft. A few years ago they were reported to have lost their heads as soon as they rose above their shelter.* Mr. Blake, in giving Kew the benefit of his experience, writes: "I may be optimistic but I honestly believe many places in the Falklands could be planted with trees and that they would flourish. It must always be remembered in those latitudes that the further west one travels the warmer the climate and that the north coast of the Islands is warmer than the southern shores. This, no doubt, is accounted for by the cold current which runs continuously from west to east, passing south of the Islands; this is not felt on the northern coasts. I fear the situation of Port Stanley is not at all suitable for tree raising experiments. I think, therefore, in making experiments these should be carried out on the north coast of the West Island. Native bushes like the Fachina, Veronica and Diddle-dee grow far larger in the north of the West Island, also there is a marked difference in some of the grasses and herbs, all going to show that the climate on the west is milder than on the east. . . . In Tierra del Fuego, with a climate far more rigorous than ours, bushes and trees grow freely. I have been able to bring a few of these bushes to the Islands—the Antarctic Beech (*Nothofagus* spp.), a kind of Laurel (*Laurelia serrata*), and Calafate (*Berberis buxifolia*)—they grow freely at Hill Cove, on the West Island. My first experiment was taking out some small Austrian Pines. Many survived the voyage and grew quite well, then I tried seeds of Austrian and Scots Pines and had no difficulty with them. I transplanted several hundreds when they were about 6 in. high in 1898 [apparently the trees mentioned by Skottsberg] when I came home, but my manager took more interest in breaking land for hay and green corn crops than in my hobby. I tried in 1914 to engage a man who would be capable of carrying out experiments for me in the Islands but without success; what is needed is a good nurseryman, one accustomed to raising trees from seed, and a man who would know when and how to transplant. There are no men in the Islands with knowledge of the craft, and again it is so long before there are any tangible results. . . . Ground must be prepared by ploughing and the rubbish must be cleared off. The soil in the best ground is a mass of roots, and to insure some measure of success the experiments should be made on a fairly large scale, ploughing and cleaning the ground is a laborious process and people in the Falklands are hardly in a position to sink the required capital. I don't think there would be much trouble over wind-breaks if suitable ground were selected in the valleys, but I doubt if any good results would be obtained by planting on the ridges where hard clay is generally found 6 or 9 in. below the surface. Gorse

* Carl Skottsberg, A Botanical Survey of the Falkland Islands, 1907–1909.

makes a good wind-break and grows freely, but the bushes I mentioned as coming from Tierra del Fuego would be better, and there is a kind of Poplar whose leaf on the underside is a silvery colour; this grows like a weed. The original plant was in Government House Gardens and I obtained a slip or two in Governor Kerr's time. Willows grow freely."

In January, 1911, suggestions for tree planting in the Falklands were made by Kew on behalf of Mr. E. P. Cotton, and within the last few months advice has again been sought.

From the foregoing notes it is plain that with the exception of the work carried out by Mr. Blake no real effort has been made to establish trees in the Falkland Islands under forest conditions and that the trees planted in gardens have apparently survived only so long as they were well sheltered. Therefore, although many of the introduced trees seem to have disappeared within a few years, it has yet to be found out whether trees planted in large enough blocks to afford one another shelter will succeed. With this in view the following suggestions have been made.

In any attempt that may be made to establish trees in the Islands, the authorities must be prepared for a good deal of experimental work and many disappointments before they can entertain an idea of establishing a successful forest area or be certain of the impossibility of such an object. Unfortunately there are no native trees to guide them in the selection of likely subjects for forest work, whilst soil and climate are very indifferent. Wind and the comparative scarcity of natural shelter appear to be the chief difficulties standing in the way of any attempt to establish trees in the Islands. In addition, cold and wet soil, often of a sour, peaty nature, and a comparatively low maximum temperature, all of which are more or less detrimental to tree growth, have to be faced. On the other hand, the absence of severe frost and the fact that several European trees have grown well until they reached the top of their shelter are favourable signs, and it is an encouraging fact that the European Gorse or Furze attains its maximum height in the Islands and that a Poplar and Willows thrive. This proves that, given shelter, the soil conditions can be adapted for the successful growth of certain exotic trees and in any future operations that may be contemplated provision should be made for planting the trees in large blocks, for the greater the depth of a plantation the taller the trees are likely to grow. In small woods planted in exposed places, practically all the trees are exposed and stunted, whereas in a wider area each succeeding rank of trees grows a little taller than the one immediately in front until finally well-developed specimens are obtained. For experimental purposes at least 50 acres in not more than three areas should be planted, provision being made for their proper upkeep for at least ten years. The most suitable position would probably be found in the valleys of the West Island. At the end of ten years it would be possible to form a fairly accurate idea as to whether tree planting upon a more extended scale was justifiable and likely to be of benefit

to the islanders, or whether the project was doomed to failure. In any case, if proper records were kept, the experiment would be of considerable value in the event of future operations of the same nature being suggested.

In order that any experiments that may be contemplated should not fail through want of proper attention to details, it is desirable that an intelligent man should be appointed who would be able to give his whole time to the work and be able to keep proper records. A young man with practical knowledge of forest work at a high elevation in the West Highlands of Scotland or on the mountains of Wales would be desirable, more particularly a man who was capable of training youths in all kinds of practical work, *i.e.*, seed sowing, nursery planting, permanent planting, preparing ground, fencing, draining, road-making, &c.

The provision of shelter appears to be the key to successful tree planting in the Falklands for, given shelter from wind, other conditions of climate and soil can be met. The only native plant that can be depended upon for shelter is *Veronica elliptica*, and the maximum height of that plant is barely 7 ft. For shelter purposes the height may be taken as from 4 to 5 ft. There are other native shrubby plants growing from 1 to 4 ft. high which may also be of some value for certain places. Fortunately the common Gorse grows well in the Islands. It is a good shelter plant and in addition to being used for hedges, seed might be sown over land to be planted with trees two or three years in advance of the trees. Land that is already covered with Gorse could be dealt with immediately. In addition, various subjects such as those mentioned by Mr. Blake might be procured from Tierra del Fuego. Round the outskirts of a plantation a belt of Gorse or Veronica as dense as possible should be formed. The accompanying photograph gives a good idea of the value of Gorse as a hedge plant for the Falklands. The outer belt for a plantation should be 6 or 8 ft. wide, or perhaps a little wider on the side of the prevailing wind. Behind this the shelter plants should be thin enough to allow of trees being planted 3 ft. apart. This distance is approximate, and it may be found advisable to have small groups of shelter plants with young trees in between or even parallel, narrow hedges 12 to 20 ft. apart. In no case, however, ought the shelter plants to be allowed to form large gaps amongst the trees. They are simply to protect the young trees for a few years, afterwards they must provide their own shelter, which they are best able to do by forming a dense mass of branches. It is not advisable to form a straight boundary line to a plantation, an undulating outline often forming a better wind-break in addition to presenting a better appearance.

In places where the soil is naturally of a loamy or sandy nature and is naturally drained, it can be prepared for planting with little trouble. If clear of bushes it may be ploughed or turned over by some other means, but when bushes exist the intervening spaces should be dug, removing at the same time any plants not required for shelter. When the ground is naturally wet, open drains, 15 in. wide and $1\frac{1}{2}$ to 2 ft. deep,

or wider and deeper if necessary, should be dug at intervals of from 12 to 20 ft., parallel with the natural slope of the land. In the case of wet and sour peat, drains should be opened about 6 ft. apart. They should be 15 in. wide and 15 to 18 in. deep, the peat being removed in large blocks and laid upside down on the margins of the drains to sweeten; occasional wider and deeper drains may be required. From 4 to 6 months afterwards, a young tree may be planted in the centre of each turf, taking care to pulverize the soil well as it is replaced about the roots. A little basic slag may be mixed with the soil at the time. By the time the young trees have filled the upturned and inverted sod with roots, the upper or drained portion of the peat bed will have become sufficiently sweetened by drainage and the admission of air for the roots to enter. When cutting drains and arranging planting positions in this way the men should work in pairs, otherwise, for convenience, they are inclined to cut the peat out in small sections which are unsuitable for the subsequent reception of plants. As a rule the turves are so arranged that the plants can be placed about 3 ft. apart. Vacancies caused by the death of young trees must be filled at an early opportunity. Should a hard pan of clay or gravel occur a little below the surface of the ground it must be broken up during the preparatory work.

All ground that is to be planted with trees must be provided with a sheep- and rabbit-proof fence, otherwise the young trees will probably be eaten off soon after they are planted.

An acre or two of ground in a favourably situated part of the area selected for planting should be set apart for a nursery. The ground must be trenched, manured, and properly cultivated. Any ground not required for immediate use might be planted with potatoes, turnips or some other crop. Shelter must be provided by a wall or by a good hedge of Veronica, Gorse or some other subject; one or two cross hedges would also be an advantage. The seeds should be sown in beds 4 ft. wide and any convenient length, separated by paths 15 in. wide, advantage being taken of the earliest dry days of spring to carry out the work. When the young plants are about 3 in. high they must be transplanted into nursery lines 12 in. apart and 2 to 4 in. between the plants. In this position they will remain until 6 or 9 in. high. Any trees that can be increased by cuttings, such as Willows or Poplars, may be started in the nursery or in the places the trees are to occupy. Stock plants ought, however, to be kept for cuttings so that trees in permanent positions could be left untouched.

When the young trees are from 6-9 in. high they should be placed in permanent positions and spaced from 3-4 ft. apart, according to the nature of the soil and the species. They must be lifted carefully so that all the roots are preserved, and during planting, if the ground has not been previously worked, care must be taken to make the holes wide enough to allow the roots to spread out to their full extent. Care must also be taken to keep the upper roots near the surface of the soil. Early autumn and spring are the best times for planting trees. Probably autumn

will be the most satisfactory time for the Falklands as the winds are stated to be at the worst in spring.

On account of the peculiar conditions prevailing in the Islands it is probable that evergreen coniferous trees will prove more successful than deciduous, broad-leaved trees, and for general planting, particularly on the wetter ground, it is likely that the most appropriate tree of all will be *Picea sitchensis*, followed by *Picea Engelmanni* and *Picea alba*. The two former are natives of Western N. America and the latter of Eastern N. America. For well-drained land *Pinus Banksiana* from N. America, *P. contorta* var. *Murrayana* from Western N. America and the European *Pinus Cembra* and *Pinus sylvestris* might be tried. As a shelter tree for the outskirts of plantations a trial should be made of the Austrian Pine (*Pinus Laricio* var. *nigricans*). This is an excellent shelter tree although its timber is not of good quality. Other Conifers such as *Cupressus nootkatensis*, *Cupressus macrocarpa*, *Thuya plicata*, and *Araucaria imbricata* are worth a trial.

Amongst broad-leaved trees the most likely ones to succeed are Birches, Alders, Willows, Poplars and the Antarctic Beeches. Of the Birches the form of *Betula alba*, known as *pubescens*, and the N. American *B. occidentalis* and *B. papyrifera* should be tried. The most suitable Alders are *Alnus glutinosa*, and *A. incana*, both European trees adapted for wet ground. Of the tree Willows *Salix alba*, *S. coerulea*, *S. fragilis* and *S. viridis* are suitable, whilst of basket-making Willows *S. triandra*, *S. viminalis*, *S. purpurea* and *S. rubra* might be tried. Poplars should be represented by *P. Eugenei*, *P. serotina*, *P. canescens*, and *P. trichocarpa*. The Sycamore, *Acer Pseudoplatanus*, and the Antarctic Beeches from Tierra del Fuego are also worth attention. For shelter and ornament the following small trees and shrubs may be tried. *Ligustrum ovalifolium*, *L. vulgare*, *Tamarix* in variety, *Sambucus nigra*, the stronger-growing New Zealand Veronicas, *Hippophae rhamnoides*, *Escallonia macrantha*, *Pyrus Aucuparia*, *P. Aria*, *P. intermedia*, *Berberis Darwinii*, *B. Aquifolium*, *Rhododendron ponticum*, *R. catawbiense*, *Olearia Haastii*, *Calluna vulgaris*, and *Cytisus scoparius*.

To conduct anything like an exhaustive experiment with trees planted under forest conditions will entail some considerable expense, but that cannot be avoided, and in a letter to Kew, dated 14th April, 1919, Mr. Blake says that he is willing to undertake the preparation of all the land required for such an experiment providing an expert man is provided to control the work.

It is to be hoped that the Government of the Falkland Islands may find itself in a position to accept Mr. Blake's interesting offer, as the proper preparation of the ground, which is a matter of considerable expense, is of prime importance, and such an experiment should certainly be made.

Tussock Grass or Tussac Grass.

Poa flabellata, Hook. f., the Tussock or Tussac Grass, is one of the most interesting plants of the Falkland Islands. It is

a perennial and forms large clumps or masses rising to a height of 7 ft. with long, arching leaves which possess valuable feeding properties and are greedily eaten by horses, cattle and sheep. The bases of the leaves, stem and rootstock are sweet, with a nutty flavour, and offer such a temptation to horses and cattle that when allowed free access to the plants they almost invariably kill them by eating them to the ground line. Sections of the stems cut into small pieces and prepared in various ways are also eaten by the inhabitants, whilst one of the early Governors of the Islands records that two deserters from an American ship kept themselves alive for 14 months by eating the stems.

Attention was originally directed to the plant by Col. Moody, the first Lieut.-Governor of the Falklands, in 1842, in a despatch to Lord Stanley at the Colonial Office. During the same year the Antarctic Expedition under Sir James Clark Ross wintered in the Islands and Dr. Hooker paid a good deal of attention to the grass, sending home a description and apparently seeds to his father, Sir William Hooker, at Kew, who, in turn, read a paper on the plant before the Geological Society in November, 1842. From that time onwards for several years Governor Moody continued to direct the attention of the Colonial Office to the value of the grass as a fodder plant and strongly recommended on several occasions that experiments should be made with it on the exposed shores of the islands on the coast of Scotland, suggesting that one of the small islands of the Orkneys, such as Hunda, should be given up for the purpose. He further recommended that a man should be sent out to study the plant and collect seeds.

In 1844 Governor Moody reported to Lord Stanley that a settler, Jergen Christian Detleff, had a parcel of 6 lbs. of Tussac seed for sale, which he was desirous of sending to England and for which he expected not less than £2 10s. a pound, but for a large quantity he would probably accept a less price per pound. In this report the Governor very strongly recommended that the grass should be given an extensive trial in Britain, and on 1st February, 1884, in a letter to Sir W. Hooker, he advised the despatch of a quantity of seed for Kew, enclosed with a larger amount to Lord Stanley at the Colonial Office, with a quantity from a settler on speculation for sale. This seed appears to have been widely distributed, and there is evidence that within a few months plants were growing at Kew, Glasnevin, Clonbrenny in County Meath and in the Island of Lewis. It is only in the latter place, however, that there is any reason to suppose that it was planted as a farm crop. The seed was sent to Lewis by Mr. (afterwards Sir James) Matheson, then a Member of Parliament, and the cultivation of the grass was undertaken by Mr. Scobie. Writing to Mr. Matheson in 1849, Mr. Scobie reported "The seeds which you sent me in 1844 were sown the following spring in various parts of the islands, viz., Coll, Holm, Linshader, Golson, &c.; of all these the two former were the only places where this valuable grass appeared, and of these two Holm was the most successful and vigorous, being sown in a square plot of deep, brown moss of

medium dryness close to the sea." About this time Lewis-grown seed appears to have germinated fairly well and all spare seed was sent to Messrs. Lawson of Edinburgh. The only sample in the Kew Museums was procured from that firm and was from the 1850 crop. Some years later when seeds were required to send to Australia there was a difficulty in obtaining them fully developed or fertile. On several occasions between 1850 and 1888 plants were sent from Stornoway to Kew for distribution to other places. In 1888, however, the farm-grown plants had disappeared from Lewis owing to the apathy of the farmers and their objection to planting a grass that required cultivation and could only be fed to stock in a cut state, through the animals killing the plant when allowed to graze upon land where it was planted. The plants obtained in 1888 were from the private garden of Sir James Matheson at Stornoway, and some were sent to Prof. Hartog at Cork, who reported the following year that the grass was doing well on drained bog at Dunmanway. In 1889 Prof. Hartog received seeds direct from the Falkland Islands which seem to have grown well in Ireland. He sent seeds to Kew and other places which do not appear to have caused later comment. As a matter of fact the grass does not grow well at Kew; it never becomes vigorous and soon dies out. It apparently must have a comparatively cool climate and a peaty soil. As Mr. Scobie attained a greater degree of success than any other planter in Britain so far as records show, it may be advisable to quote his remarks regarding the behaviour of the grass in Lewis. He says: "The seed was sown in a square plot of deep brown moss of medium dryness close to the sea. The moss, scarcely yielding anything previous to its being turned over and enclosed, was delved and cut into small pieces with the spade, and the seeds sprinkled in and roughly covered with a rake, and trampled at the same time with the feet. The second year the stools were almost as strong as the third, though it is allowed this grass only attains maturity the third year, it cast seed the second and third years. Three acres were delved over, of the same deep moss, in spring, 1847, to the depth of 12 in., and after it was packed with a hoe, a sprinkling of guano applied, and single plants dibbled in 3 ft. 4 in. apart. The whole of this prepared moss is drained 3 ft. deep and 20 ft. apart, being moss drains. I think the moss for the Tussac should be delved over in January, and a light spading of moss thrown over the surface, out of the bottom of the trench, to keep out the sun from drying-up the moss too much. February March and April are most advisable for planting, May and June having proved too late and dry. Plants supplied with seaweed manure are greener in the leaf and thriving better than the rest. Some failure occurred from wet rising from below in the moss, and also from imperfect drainage, and from drought, the peat being liable to become very hard in summer. Seaweed spread over the surface of the ground in summer is an advantage."

According to a Kew record dated 1877,* the plants on Sir

* Kew Report, 1877, p. 21.

James Matheson's land in the Hebrides had for some time suffered from the attacks of a coleopterous larva. By the same note we find that Sir Joseph Hooker had by that time modified his views regarding the general value of the grass, for he says: "I have expressed my doubts as to the plant being really adapted for pasture purposes. The Tussocks are only formed slowly, and would be soon destroyed by cattle, and the plant consequently exterminated."

Within the last few years recommendations have been made that the grass should be widely planted in the colder and more exposed parts of Britain, but before undertaking experiments, intending cultivators would be well advised to take advantage of the experience gained from previous experiments, and to remember that the plant can only be grown successfully in positions near the sea, and on properly drained and cultivated ground. Moreover, the leaves must be cut and fed to cattle, for if cattle are allowed free access to the plants they are invariably killed by the animals eating the bases. It must also be remembered that the grass has not come up to expectations in the past, either here or in the Falklands, where in 1844 it was referred to as the Golden Glory of the Falkland Islands.*

There appears to have been some disagreement as to the date of introduction of Tussock Grass into the British Isles. The Ross Expedition has been credited with its introduction in 1842, and another date is given as 1844. The matter appears to be settled in "Life and Letters of Sir J. D. Hooker," i. p. 130. Answering a letter to Sir J. Ross in November, 1844, Sir Joseph wrote: "I am delighted to hear that some of the old Tussac vegetated, as everyone has said that our expedition seed all failed. It is quite a triumph to me, I can assure you, as now the expedition was the first to introduce the grass. I have 11 plants in my bedroom, growing very slowly, and there are a great many in the garden." This evidence is, however, discredited by a later letter written to Sir J. Ross on 1st September, 1845, for Sir Joseph wrote: "your excellent brother's plant of Tussac flowered with us and turned out to be the British *Dactylis glomerata*, to our shame and confusion at Kew. . . . The fact is that we have only lately procured seeds and raised young plants of the true Tussac." This suggests that the first plants were raised from seeds sent by Governor Moody in 1844.

For an exhaustive account of the introduction to, and experimental planting of Tussock Grass in Britain, the Journal of the Royal Agricultural Society, 1842-1850, should be consulted.

Explanation of Plates.

Plate IV.—The homestead surrounded by Gorse hedges some 6 ft. or 8 ft. high. The crop being cut is green oats for hay. The house stands about 80 ft. above sea level. All the land under oats is suitable for tree-growing. The hill in the distance rises to 2000 ft.

* A Report on the capabilities of the Falkland Islands.



[*To face page 220.*



Fig. 1.



Fig. 2.

To face page 221.]

Plate V., Fig. 1.—A crop of oats with potatoes in the foreground close to the fence.

Fig. 2.—The same batch of oats seen in Fig. 1. The fence and potatoes being on the right of the photograph. The ground is all ploughed down to the beach.

XII.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM.

DECADES XCII. & XCIII.

911. Aconitum funiculare, *Stapf* [Ranunculaceae-Helleboreae]; inter species sectionis *Napelli* tuberibus hornotinis pluribus funicularibus insigne.

Tubera (in specimine unico viso) 5; unum annotinum, caetera hornotina, omnia cylindrica, basin versus attenuata, tota longitudine radices secundarias circiter 1 cm. distantes emittens, 3-9 cm. longa, 2-5 mm. diametro, viva pallide fusca, fractura nivea amylacea, sapore tolerabili; cambium cylindrum centrale tenuissimum formans. *Gemmae* tuberum breviter conicae, 3-5 mm. altae. *Caulis* erectus, 4-5 dm. altus, gracilis, pilis reversis crispo-pubescens vel superne tomentellus. *Folia* infrafloralia sub anthesi 2, caetera 4 ramulos unifloros (vel si mavis pedicellos) suffulgentia, sensim reducta, illa ambitu reniformia, circiter 3 cm. alta, 6 cm. lata, sinu lato, 5-pedato-partita, carnosula, utrinque sparse minute pilosula, segmentis cuneatis interioribus 3-lobatis extimis 2-lobatis, lobis late linearibus vel linearilanceolatis acutis; petiolus infimus 5 cm. longus, folii floralis infimi brevissimus, omnes parce minute pubescentes. *Racemus* pauciflorus; pedicelli distantes, 10-6 cm. longi, pube eadem ac caulis induti, medio 2-bracteolati, bracteolis integris linearelanceolatis, pedicellis superioribus ad 1·5 cm. longis. *Sepala* pubescentia, decidua, summum galeiforme; galea erecta, apice depressa et in rostrum breve subacutum horizontaliter producta, ad 2 cm. alta, superne 1 cm. lata (a latere visa) lilacina, rostro virescente; sepala lateralia oblique rotundato-obovata, vix unguiculata, 1·3-1·4 cm. diametro, cum galea contigua, superne pallide, inferne magis saturate lilacina, supra medium viridimaculata; sepala inferiora elliptica, subacuta, circiter 1 cm. longa, violescentia vel virescentia. *Nectariorum* ungues in galea recte ascendentes, apice prorsus curvati, 1·4-1·8 cm. longi, summo parce pilosuli, mitella latissima suborbiculari dorso vix gibbosa, glandula terminali lata viridi vel violacea, labio lato integro obtusissimo recurvo albido. *Filamenta* glabra, a medio basin versus alata pallida, supra intense coerulea. *Carpella* 5, subcontigua, patule pubescentia, apice abrupte contracta; styli 2 mm. longi.

BHOTAN, *Cooper* 3586.

The affinity of this new Aconite lies probably with *A. Hookeri*, Stapf, with which it has much in common, as to the general structure of the tubers, the facies of the leaves and the inflorescences

and the shape of the nectaries, but it differs from it in the absence of the characteristic hypogaeous portion of the stem and the remarkable rope-like tubers, which are unique in the section Napellus. The plant was raised at Kew from seed collected by Mr. Cooper for Messrs. Bees, Limited.

912. Indigofera Barberi, *Gamble* [Leguminosae-Galegeae]; *I. trifoliatae*, L. affinis, foliolo terminali petiolulato, legumine toruloso ad suturarum latera haud alato 2-4 spermo differt.

Suffrutex parvus, ramosus, ramis ascendentibus appresse griseo-pubescentibus strictis. *Folia* 3-foliolata, foliolis obovatis mucronatis appresse villosis subtus glandulosis, 1·5-3·5 cm. longis ad 2 cm. latis, terminali longiore; petiolus communis 1-2 cm. longus; petiolulus terminalis ad 1 cm. longus, laterales brevissimi; stipulae setaceae, caducae. *Flores* minuti, in racemos axillares 7-10 mm. longos multifloros aggregati. *Calyx* circa 1 mm. longus, dentibus 5 aequalibus subulatis villosis. *Corolla* exserta; vexillum ovatum, sessile; alae oblongae, basi acutae, vix in unguem contractae; carinae petala obtusa, falcata, basi calcare acuto munita. *Legumen* lineare, torulosum, ad 15 mm. longum, appresse albo-villosum, deflexum, suturis incrassatis, apice longe acuminatum, acumine recurvo, seminibus 2-4.

S. India. Cuddapah hills, *Beddome*; Melpat, S. Arcot, *C.A. Barber* 1076 (Sept. 1899); Shevaroy hills, Salem, *Bourne* 869 (October 1897).

I have long hesitated about this species. I agree with Dr. Barber in considering it as coming between *I. trifoliata*, L. and *I. trita*, L.f., and think it best to describe it as new, for I cannot consider it even as a varietv of either.

913. Erythrina mysorensis, *Gamble* [Leguminosae-Phaseoleae-Erythrineae]; *E. strictae*, Roxb., affinis, floribus minoribus, corollae alis et carina aequilongis circa 12 mm. longis, staminibus diadelphis, foliolis late ovatis abrupte acuminatis subcoriaceis differt.

Arbor, ramulis inermibus (an semper?). *Folia* trifoliolata petiolo communi 10 cm. longo, petiolulis 0·75 cm. longis, stipellis verrucosis; foliola subcoriacea, late ovata, apice abrupte acuminata, terminale 12 cm. longum 9 cm. latum, lateralia 10 cm. longa 7 cm. lata nervis utrinque 6 conspicuis quorum 2 inferiores e basi oriuntur. *Racemi* axillares, 12-15 cm. longi, floribus apicem versus fasciculatis vix 3 cm. longis coccineis. *Calyx* spathaceus, ad dimidiam partem fissus, supra minute dentatus. *Corolla* exserta; vexillum obovato-oblongum, emarginatum, 3 cm. longum; alae obovatae, 12 mm. longae; carinae petalae liberae, alis aequilongae, late falcatae. *Stamina* diadelpha, 9 et 1. *Ovarium* lineare, villosum, stylo subulato glabro. *Legumen* ignotum.

S. India. Mysore; Chickenalli, 900 m., *A. Meebold* 9728 (Nov. 1908; Herb. Calc.).

Although this is the only specimen apparently known, I have thought it best after much consideration to describe it, as the

flowers differ so greatly from those of any other species. It resembles *E. indica* in having the wings and keel equal but the flowers are very much smaller and the leaves are different.

914. Smithia Venkobarowii, *Gamble* [Leguminosae-Hedysareae]; *S. blandae*, Wall., affinis, sed floribus non paniculatis et calyce glabro margine solum breviter ciliato differt; inflorescentia subcapitata, pedunculo gracili et foliolis ad 2·5 cm. longis insignis.

Herba gracilis, suberecta vel prostrata, ramulis patule strigosis. *Folia* paripinnata, circa 3 cm. longa, foliolis 4-jugis, petiolo communi circa 15 mm. longo strigoso; foliola oblonga, glabra, obtusa, 2·5 cm. longa, 7-8 mm. lata; stipulae lineari-lanceolatae, striatae. *Flores* in racemos subcapitatos pedunculatos axillares congesti; pedunculi 2-3 ex quaque axilla, 2-4 cm. longi, graciles; bracteae paleaceae, glabrae; bracteolae subfalcatae, glabrae, aliquando paucidentatae. *Calyx* ad basim fissus, margine breviter ciliatus; labium superius latum, emarginatum, inferius 3-lobum. *Corolla* eximie lutea, exserta; vexillum orbiculatum, emarginatum; alae falcatae, obtusae, basi calcaratae; carinae petala angusta, curvata, apice acuta. *Ovarium* sessile, circa 6-ovulatum; stylus filiformis. *Lomenti* articuli 3-6, compressi, circa 1·5 mm. diametro, reticulati, margine plani.

S. India. Travancore; hills at Peermerd. *K. Venkoba Row* 3799 (Oct. 1916).

915. Desmodium wynaadense, *Bedd. MS. ex Gamble* [Leguminosae-Hedysareae]; *D. rufescenti*, DC., affinis, foliolis longioribus lanceolatis acutis, pedicellis longioribus filiformibus, leguminibus latioribus curvatis fere glabris conspicue reticulatis differt.

Suffrutex erectus, ad 3 m. altus, caule et ramulis et racemorum rhachi molliter ferrugineo-pubescentibus. *Folia* trifoliolata, pedunculo communi 1·5 cm. longo; stipulae basi lanceolatae, longe setaceo-acuminatae; stipellae etiam longe setaceae; foliola lanceolata vel oblongo-lanceolata, apice acuta vel aliquando paullo obtusa, basi attenuata, supra fere glabra, subtus pubescentia, 5-7 cm. longa, 2-2·5 cm. lata, ultimum paullo longius, nervis primariis circa 9 conspicuis, nervulis transversis multis subparallelis. *Racemi* terminales et axillares, elongati, ad 20 cm. longi, floribus sparsis singulis vel binis; bracteae lanceolatae, setaceo-acuminatae, villosae, striatae, cito deciduae, 5-6 mm. longae; bracteolae 0; pedicelli filiformes, patentes vel deflexi, 10-12 mm. longi. *Calycis* tubus brevis, dentibus hirsutis acuminatis, labio superiore bifido, inferiore longiore 4 mm. longo. *Corolla* rosea, exserta; vexillum obovatum, retusum, 6 mm. longum; alae oblongae, latae, paullo breviores; carinae petala late falcata, medio calcarata, cum alis connata. *Stamina* diadelpha, (9 et 1) antheris oblongis aequalibus. *Ovarium* sessile, lineare, pubescens, stylo geniculato glabro, stigmate parvo capitato. *Legumen* curvatum, deflexum, compressum, ad 4 cm. longum, articulis 5-8 facile secedentibus planis conspicue reticulatis

fere glabris ad suturam ventralem paullo curvatis maturitate dehiscentibus 3-4 mm. latis. *Semina* castanea, laevia, reniformia, 2 mm. longa.

S. India. Nilgiri hills; Carcoor Ghat (March 1880), *Beddome*; Nellialum, 670 m., *Gamble* 18404 (1886); Pundalar, *Lawson* (Nov. 1888); Anamalai hills, Attakatti, 980 m., *C. E. C. Fischer* 3279 (1912); Travancore hills, Arienkara, *M. Rama Row* (1912); Udambanshola, 1525 m., *Meebold* 13204 (1910).

916. Vigna Bourneae, *Gamble* [Leguminosae-Phaseoleae]; nulli aliae peraffinis, ad *V. pilosam*, Baker, calyce et corolla accedit, sed multo major, ramulis crassis ut foliis dense ferrugineo-velutinis, pedunculis longis eximie nodosis, stipulis conspicuis peltatis oblongo-lanceolatis.

Suffrutex scandens, ramulis crassis pilis ferrugineis retrorsis tectis. *Folia* petiolo ad 8 cm. longo; foliola ovata, acuminata, ferrugineo-villosa, ad 8 cm. longa, 5·5 cm. lata; ultimum saepe basi deltoideum, petiolulo circa 1 cm. longo, stipellis subulatis; lateralia basi inaequalia breviter petiolulata, etiam stipellata; nervi utrinque circa 5, 2 infimi e basi orti; stipulae peltatae, oblongo-lanceolatae, 1-1·5 cm. longae. *Racemi* axillares, pedunculis ad 20 cm. longis crassis, rhachi 6 cm. longa valde nodosa; bracteae et bracteolae oblongo-lanceolatae, hirsutae, striatae, circa 7 mm. longae. *Calyx* campanulatus, 5 mm. longus, lobis brevibus, 2 superioribus obtusis connatis. *Corolla* exserta, 1-1·5 cm. longa; vexillum latum, basi auriculatum; alae latae, obtusae, basi semi-sagittatae; carinae petala curvata, rostrata, basi breviter unguiculata. *Ovarium* villosum; stylus apice sub stigmate obliquo barbatus. *Legumen* planum, primo dense villosum, deinde glabrescens, apice subobtusum, 5-6 cm. longum. *Semina* 10-12, quadrata, 2-3 mm. longa.

S. India. Pulney Hills: Madura District; on Poombarai riverside and Kodakanal Ghat, *Sir A. G. and Lady Bourne* 1291, 2005 (1898-99).

917. Rosa (Cinnamomea) Saundersiae, *Rolfe* [Rosaceae]; affinis *R. macrophyllae*, Lindl., aculeis gracilibus, foliis tenuioribus et floribus minoribus albis differt.

Frutex ramosus, ramulis ad basin foliorum aculeis binis gracilibus et rectis instructi, caeterum glabris. *Folia* 3-7 cm. longa, 7-9-foliolata; rhachis puberula, sparse aculeolata, aculeis rectis et gracilibus; foliola subsessilia, tenuia, elliptica, subobtusa, regulariter inciso-dentata, utrinque glaucescentia, subtus in venis puberula, 1·5-3 cm. longa, 0·6-1·2 cm. lata; stipulae adnatae, oblongae, subacutae, minute ciliato-glandulosae, circiter 1 cm. longae. *Flores* 3-3·5 cm. diametro, albi, in ramulis brevibus solitarii vel pauci. *Pedunculi* 2-2·5 cm. longi, puberuli et glandulosi. *Receptaculum* anguste ellipsoideum, 0·6 cm. longum, copiose glandulosum. *Calycis* lobi ovato-lanceolati, caudato-acuminati, patentes, circiter 2 cm. longi, apice interdum subfoliacei, intus canescenti-tomentosi, extus tomentosi et glandulosi. *Petala* obovata, 1·5 cm. longa, alba. *Filamenta*

glabra, 2-3 mm. longa. *Carpella* villosa; styli 3 mm. longi. *Fructus* ellipsoideus, coccineus, 1·5 cm. longus.

N.W. India. Murree, on lower forest road and in the gullies, *Miss E. M. Saunders*, June-July, 1915.

This is recorded by Miss Saunders as an erect shrub with long, straight thorns and white petals. With the general habit and characters of *R. macrophylla*, Lindl., it is more comparable with *R. Fedtschenkoana*, Regel (as shown in Bot. Mag. t. 7770), in the shape and texture of the leaflets and colour of the flowers. It may also be compared with the Western Chinese *R. Murielae*, Rehder & Wils., though that has more coriaceous and less dentate leaflets and longer pedicels. Nothing like it has been found among Asiatic Roses, and as comparatively little is known about the flora of the Murree Hills, which reach an altitude of 7000 to 8000 ft., it is here described as new. The materials sent include both flowering and fruiting specimens.

918. Bruguiera Hainesii, *C. G. Rogers* [Rhizophoraceae-Rhizophoreae]; species *B. gymnorhizae*, Lam., *B. eriopetalae*, W. & A., *B. caryophylloidei*, Blume, quodammodo affinis, ab omnibus trunci magnitudine corticis charactere facile distinguitur; ab illis duabus pedunculis 2-floris, sepalis brevioribus,* petalis multo brevioribus, petalorum lobis prope apices extus leviter pilosis, ab hac floribus multo majoribus, calycis tubo cylindrico-obconico neque ellipsoideo sepalis erectis differt.

Arbor magna ad 24 m. alta et 70 cm. trunci diametro, cortice rugoso. *Folia* anguste-elliptica, utrinque cuneata, basi in petiolum 2·5-4 cm. longum angustata, 9-13 cm. longa, 4-7 cm. lata. Pedunculi breves, 7-13 mm. longi, 2-flori; pedicelli 6-8 mm. longi. *Flores* 2·2-2·5 cm. longi,* calycis tubo sepalis aequali vel longiore leviter 10-angulato nunquam jugis prominulis instructo. *Sepala* lineari-subulata 10. *Petala* 2-loba, 7-8 mm. longa, marginibus inferne villosis, versus loborum apices extus leviter pilosa, loborum apice 2-3 setis cum una seta longiore in fissura instructa.

Burma. Mergui, in Tidal Forests, *Rogers* 456 M.

This new species differs from both *Bruguiera gymnorhiza* and and *B. eriopetala* in the size of the tree and in the bark. Both these species are the same size. They attain a height of 60-80 ft. with a clean bole of from 40-60 ft., with a girth at breast height over the bark of from 40 to 54 in. The new species grows to a height of 100 ft., with a clean bole of 75 ft., and a much rougher somewhat tesselated bark, and a girth of 60 to 72 in. It is a distinctly taller and larger tree.

The tree was not uncommon in the Panadaung Reserve (immediately to the south of the Bokgyi creek, about 30 miles up the coast (North) of Mergui Civil Station) and will, I feel confident, be bound to be fairly common throughout the Mergui District. The specimens were collected on the 2nd January, 1919. We had considerable difficulty in finding flowers with petals then. The ground on which the trees stood was only inundated for a few hours at fairly high spring tides.

* Measurements of the flowers are taken after opening and before the fall of the petals, after which the size increases as in other species.

919. Sonerila pulneyensis, *Gamble* [Melastomaceae-Sonerileae]; nulli aliae peraffinis, ramulis repentibus radicantibus, foliis carnosis ovatis, calycis tubo fructifero campanulato laevi insignis.

Frutex carnosus, humilis, ramulis repentibus radicantibus glabris. *Folia* carnosa, ovata, mucronato-serrata, glabra, apice acuta, basi in petiolum attenuata, 2-5 cm. longa, 1-3 cm. lata, nervis circa 5 gracilibus ex apice petioli ortis, aliis utrinque circa 5-6 obscuris, omnibus apicem versus curvatis; petiolus 5-15 mm. longus. *Cymae* axillares 2-5-florae, pedunculo communi 3-4 cm. longo; pedicelli 1 cm. longi. *Flores* adhuc ignoti. *Capsula* campanulata, 7-10 mm. longa, pallida, laevis et lucens. *Semina* 1 mm. longa, laevia, raphe conspicua circumdata.

South India. Pulney hills; in the Pambar ravine, June, 1899, *Sir A. and Lady Bourne* 1341.

Although the flowers have not yet been collected, I have thought it right to describe this plant from the excellent fruiting specimens in Herb. Kew, so as to include it in the "Madras Flora."

920. Memecylon flavescens, *Gamble* [Melastomaceae-Memecyleae]; species insignis foliis parvis oblanceolatis flavescentibus, *M. Lushingtonii*, Gamble, plus minus affinis, floribus in cymis parvis in tuberculis parvis et bracteolis ovato-lanceolatis differt.

Arbor parva, ramulis nodosis griseis gracilibus, ultimis tetragonis. *Folia* coriacea, oblanceolata vel spathulata, apice rotundata vel raro subacuta, basi cuneata, 3-5 cm. longa, 1-2·5 cm. lata, marginibus recurvis, nervis perobscuris, siccitate flava; petiolus circiter 5 mm. longus, laminae marginibus decurrentibus alatus. *Flores* in tuberculis parvis axillaribus vel lateralibus fasciculati; bracteolae ovato-lanceolatae; pedicelli 1-2 mm. longi. *Calycis tubus* supra ovarium campanulatus, lobis 4 rotundatis, disci radiis obscuris. *Petala* pallide caerulea. *Antherae* breves, curvatae. *Styli* filiformes. *Bacca* globosa, subcarnosa, caerulea, 7 mm. diametro.

South India. Kundahs country of Nilgiri hills, about Avalanché and Sispara, 2300-3460 m., in evergreen Shola forest, *Gamble* 14268, 16161, 16168, 20581.

921. Memecylon Lawsoni, *Gamble* [Melastomaceae-Memecyleae]; *M. Heyneano*, Benth., affine, foliis multo minoribus, nervis obscuris, florum fasciculis paucifloris, bracteolis ovatis nec lanceolatis differt.

Frutex erectus, ramulis teretibus griseis. *Folia* lanceolata, acuminata, basi attenuata, 6-10 cm. longa, 2-3 cm. lata, glabra; nervi obscuri, utrinque 6-10 in nervum intramarginalem arcuatum desinentes; petiolus ad 5 mm. longus. *Flores* sessiles, circa 6-10, in tuberculis axillaribus fasciculati; bracteolae ovatae, minimae. *Calycis* tubus campanulatus, vix 2 mm. longus, lobis 4 brevibus obtusis. *Petala* matura desunt, verisimiliter caerulea. *Stamina* brevia, connectivo producto obtuso. *Bacca* immatura, 2-3 mm. diametro.

S. India. South-east Wynaad, *M. A. Lawson* (Nov. 1884).

922. Memecylon Lushingtonii, *Gamble* [Melastomaceae-Memecyleae]; species distincta ramulis gracilibus pallidis ultimis subtetragonis, foliis parvis siccitate non flavescentibus et florum fasciculis perbrevibus paucifloris distincta.

Arbor parva, ramulis nodosis griseis gracilibus, ultimis subtetragonis. *Folia* chartacea elliptica vel elliptico-lanceolata, apice obtusa vel interdum emarginata, basi subcuneata 3-5 cm. longa, 1-2 cm. lata, nervis perobscuris, siccitate viridia; petiolus 2 mm. longus. *Flores* in tuberculis axillaribus vel lateralibus (foliorum delapsorum) fasciculati, fasciculis circiter 5 mm. latis; bracteolae minimae; pedicelli perbreves. *Calycis tubus* supra ovarium patelliformis vix 1 mm. longus, lobis 4 brevibus triangularibus, disci radiis obscuris. *Petala* pallide caerulea. *Antherae* breves, curvatae, filamentis filiformibus. *Styli* filiformes, conspicui. *Bacca* globosa, sicca, flavescens, 5-6 mm. diametro.

South India. Cuddapah District, on Horsleykonda, 1300 m., *Gamble* 15110; Coimbatore District, at Osahatti, *A. W. Lushington;* Nilgiri hills at Coonvor and elsewhere, at 1300-1900 m., *Gamble, Bourne.*

923. Memecylon madgolense, *Gamble* [Melastomaceae-Memecyleae]; species *M. marginato,* Blume (*M. intermedio,* C. B. Clarke in Fl. Br. Ind. ii. 561) affinis, foliis minoribus et praecipue pedunculis et pedicellis brevioribus differt.

Frutex erectus, ramulis teretibus brunneis scabris. *Folia* coriacea, lanceolata, apice obtusa caudato-acuminata, basi acuta, 5-9 cm. longa, 2-4 cm. lata, nervis utrinque circa 8 obscuris in nervum obscurum intramarginalem desinentia, siccitate viridia; petiolus 3-5 mm. longus. *Flores* in cymis parvis paucifloris lateralibus; pedunculi 3-4 mm. longi; pedicelli graciles, breves, fructiferi longiores. *Calycis tubus* patelliformis, 3 mm. diametro, lobis obscuris, disci radiis 16 manifestis. *Petala* nondum visa. *Bacca* (immatura) sicca 4 mm. diametro.

South India. Madgol hills of Vizogapatam at 1000 m., Jan., 1914, *A. W. Lushington.*

The material of this species is very poor, but it seems quite distinct from any other of the South Indian species. It may, however, prove eventually to be the same as the plant mentioned by H. H. Haines in his "List of the Trees, etc., of the Southern Circle, Central Provinces," p. 32, as *Memecylon edule* var. *contractum,* but the specimen of that plant at Kew has much more yellow and shining leaves and almost no peduncles.

924. Memecylon sisparense, *Gamble* [Melastomaceae-Memecyleae]; *M. malabarico,* Cogn., affinis sed major, foliis petiolatis supra non lucidis basi minus cordatis, floribus permultis aggregatis lateralibus vel aliquando axillaribus differt.

Arbor parva vel frutex elatus ramis crassis griseis subscabris, ramulis teretibus. *Folia* coriacea, ovato-oblonga, apice obtusa vel acuta, basi rotundata vel paullo cordata, 6-10 cm. longa, 2·5-4·5 cm. lata, marginibus saepe recurvis, nervis utrinque

circiter 10 irregularibus in nervum intramarginalem arcuatum desinentibus, siccitate olivacea; petiolus crassus, 2-4 mm. longus. *Flores* in tuberculis lateralibus vel aliquando axillaribus fasciculati; fasciculi saepe magni, ad 2 cm. diametro; calyx ruber; corolla insigniter caerulea; bracteolae minimae, ovatae; pedicelli filiformes, 3-4 mm. longi. *Calycis tubus* ultra ovarium campanulatus; lobi 4, subacuti; disci radii haud manifesti. *Petala* angulata. *Styli* filiformes, conspicui. *Bacca* nondum visa.

South India. Nilgiri hills, on Sispara Ghat, 1600 m., June, 1884, *Gamble* 14467; *Wight* (Kew Distrib. 1071); *G. Thomson.*

925. Pimpinella pulneyensis, *Gamble* [Umbelliferae-Ammineae]; *P. Leschenaultii*, DC., affinis, foliis caulinis inferioribus longissime petiolatis, nervis palmatis multis ex insertione petioli ortis, bracteolis umbellularum linearibus, fructu ovato jugis conspicuis differt.

Herba biennis? vel perennis, 30-60 cm. alta, radice incrassato fusiformi. *Folia* inferiora caulina orbicularia, cordata, sinu circiter 2 cm. lato, margine serrata, supra ad nervos hispido-pubescentia, subtus glabra, 6 cm. diametro, nervis multis (8-10) ex insertione petioli palmatis, cito ramosis et reticulationem conspicuam formantibus, petiolis 20-30 cm. longis tenuibus pubescentibus, superiora pauca pinnatim decomposita, parva, ultima linearia. *Umbellae* compositae, radiis gracilibus puberulis circiter 10-20 ad 3 cm. longis, bracteis involucrantibus mollibus; umbellulae parvae, bracteolis paucis linearibus persistentibus. *Petala* alba, inflexa, acumine longo acuminato inflexo. *Ovarium* disco pulvinato coronatum, stylis elongatis. *Fructus* ovoideus glaber, stylopodio crasso conico coronatus; juga primaria conspicua 3 a dorso 2 a commissurae margine; vittae in valliculis lateralibus 3 minimae. *Semen* verosimiliter teres ad faciem commissuralem planum.

South India. Bear Shola stream and elsewhere at Kodaikanal, Pulney Hills, May, 1897, June, 1898, *Bourne* 24, 956.

This is the plant described by Mr. P. F. Fyson in his "Flora of the Nilgiri and Pulney Hilltops," p. 172, as the "Pulney form" of *P. Leschenaultii*. He says it frequents damp or cool places near Sholas (evergreen forests), flowering from May to September, while the Nilgiri *P. Leschenaultii* is an erect short-leaved plant of the open downs. The long petioles and the interesting venation of the leaves of *P. pulneyensis* are quite remarkable.

926. Schefflera Bourdillonii, *Gamble* [Araliaceae-Scheffleraeae]; species distincta, *S. emarginatae*, Harms., quoad foliola parva obovata affinis, sed foliola 5 nec 1-3 et inflorescentia compacta stellato-villosa pedunculo perbrevi.

Frutex epiphyticus, 3-4 m. altus, ramulis lenticellatis et cicatricibus annularibus foliorum delapsorum notatus. *Folia* ad apices ramulorum conferta, digitata, 5-foliolata, petiolo circiter 6 cm. longo basi dilatato glabro; foliola coriacea, obovata, apice obtusa vel emarginata, utrinque glabra 4-5 cm.

longa, 2 cm. lata, margine revoluta, nervis utrinque 2-4 arcuatim junctis et reticulatione conspicua insignibus, petiolulo 1-1·5 cm. longo apice articulato. *Flores* (♀ tantum noti) in racemis umbellarum brevibus subsessilibus stellato-villosis 2-3 cm. longis; pedicelli 1-2 m. longi. *Calycis lobi* 0. *Petala* 5, ovata, acumine inflexo, calyptratim decidua. *Stamina* ignota; staminodia in flore ♀ 5 subulata. *Ovarium* turbinatum, loculis 5, stylis perbrevibus. *Fructus* ignotus.

South India. Near Chimunjee, Travancore, in evergreen forest at 1300 m., April, 1895, *T. F. Bourdillon* 576.

927. Schefflera bengalensis, *Gamble* [Araliaceae-Schefflereae]; *S. Roxburghii*, Gamble, (*Aralia digitata*, Roxb.) affinis, foliolis angustioribus oblongis regulariter nervosis et umbellarum racemis brevioribus differt.

Frutex scandens, ramulis crassis foliorum delapsorum cicatricibus annularibus notatis. *Folia* digitata, foliolis 5 oblongis vel oblongo-lanceolatis glabris 8-20 cm. longis 3-7 cm. latis apice cuspidato-acuminatis basi attenuatis vel subrotundatis; foliorum nervi primarii circiter 8-10, regulares, ad marginem curvati, secundarii et reticulatio satis prominentes; petioli crassi, 10-20 cm. longi, petioluli 2-6 cm. longi; stipulae intrapetiolares rotundatae, crassae. *Flores* sordide rubri, in umbellis in racemorum paniculis terminalibus vix 8-10 cm. longis; rhachis communis crassa, glabra; racemi circiter 10-12 cm. longi; umbellarum pedunculi 1-2 cm. longi; pedicelli breves, 1-2 cm. longi; bracteae in alabastro magnae, orbiculares, floccoso-puberulae, cito deciduae. *Calycis tubus* campanulatus, glaber, truncatus. *Corolla* valvata, calyptratim decidua; lobi ovati, 2 mm. longi. *Ovarium* 5-loculatum. *Fructus* carnosus, siccitate 5-angulatus, glaber. *Heptapleurum venulosum*, Seem.; Fl. Br. Ind. ii. 729, in part.

North India. Mountains of Sikkim at 320-1600 m., *J. D. Hooker*; *C. B. Clarke*; *J. S. Gamble*. Bhutan; *Griffith* (Kew Distrib. 2692); Khasia Hills and Sylhet, *J. D. Hooker and T. Thomson*; *Simons*; Upper Burma; *Smales*.

928. Linociera Parkinsonii, *Hutchinson* [*Oleaceae*-Oleineae]; affinis *L. spicatae*, Ridley, sed foliis basi acute cuneatis chartaceis, pedicellis et calyce puberulo differt.

Ramuli cortice pallide cinereo obtecti, teretes, glabri, laxe foliati. *Folia* oblongo-elliptica, basi cuneata, apice longissime acuminata, obtusissima, 5-12 cm. longa, 2-4 cm. lata, chartacea, supra nitidula, infra opaca, utrinque glabra, costa supra impressa infra valde prominente, nervis lateralibus utrinsecus 6-7 a costa sub angulo latissimo abeuntibus circiter 5 mm. intra marginem junctis infra prominulis; petioli 2-4 mm. longi, glabra. *Flores* axillares, pauci, laxe glomerati; bractae minimae; pedicelli circiter 2 mm. longi, minute puberuli. *Calycis segmenta* 4, anguste triangularia, acuta, 1·5 mm. longa, extra puberula. *Corollae* tubus 2 mm. longus, glaber: segmenta linearia, 4·5 mm. longa, subobtusa, marginibus involutis.

Antherae subsessiles, 1 mm. longae. *Ovarium* glabrum, stylo brevi. *Fructus* juniores anguste et oblique ellipsoidei, basin versus contracti, 1-3 cm. longi.

Andaman Islands. Middle Andaman; Born-lung-ta, up to 60 m., fls. May, 1916, *C. E. Parkinson* 1210; young fr. Nov. 11, 1915; *C. E. Parkinson* 727.

929. Sarcococca vagans, *Stapf* [Buxaceae]; species maxime affinis *S. trinerviae*, Wight, sed habitu vagante laxe ramoso, racemis ♂ laxioribus, floribus ♂ paulo minoribus, ♀ longius pedicellatis differt.

Frutex vagans; juvenilis spinosus (teste English), ramis virgatis saepe flexuosis laevibus glaberrimis cortice pallide viridi tecta. *Folia* 1·25-3 cm. distantia; lamina ovato-vel ellipticolanceolata vel elliptico-oblonga, basi breviter vel brevissime acuta, apice acute acuminata, 8-13 cm. longa, 4·5-5·5 cm. lata, pergamacea, glaberrima, viridia, vix lucida, triplinervia, nervis lateralibus primariis 5-7 mm. supra basin ortis, secundariis utrinque 2-3 cum primariis arcuatim connectis arcu primo (nervi primarii) ultra medium producto, caeteris multo brevioribus; petiolus 1-1·5 cm. longus. *Racemi* solitarii, erecti, laxiusculi (pro genere), 1-1·3 cm. longi, plerumque ima basi ♀, caeterum ♂; rhachis inter flores ♂ exposita, glabra; bracteae late ovatae, subobtusae, ad 1 mm. longae, sub anthesi olivaceae, albido-marginatae, minute ciliolatae, deinde rubescentes; *Flores* ♂: pedicelli bractea breviores; bracteolae 2, bracteis simillimae, nisi paulo majores, perianthio approximatae. *Perianthium* 4-phyllum; segmenta late oblonga, obtusa, 2 mm. longa, structura coloreque bracteis bracteisque similia. *Filamenta* gracilia, e perianthio breviter exserta; antherae maturae haud visae. *Flores* ♀ plerumque 2 (vel 1 vel 3) ad basin racemorum mixtorum vel rarius in inflorescentiis valde reductis unisexualibus; pedicelli in fructu graciles, ad 4 mm. longi; bracteolae 3-4-pares, ovatae, acutae vel subacutae, vix 1 mm. longae, in pedicello maturo oblique patentes. *Perianthium* 4-phyllum; segmenta late ovata, minute ciliolata, acuta, matura 2-3 mm. longa, haud rubescentia. *Fructus globosus*, 8 mm. diametro, ut videtur atro-caeruleus.

Burma. Maymyo Plateau, 1000 m.; flor. 24. x. 1908, *Lace*, 4357; by streams, fruct. l. iii. 1914, *English*. Upper Burma, without precise locality, fruct. immat., Dec. 1901, *Smiles*.

930. Chrysopogon setifolius, *Stapf* [Gramineae-Andropogoneae]; affinis *C. pallido*, Stapf (Andropogoni pallido, *Kunth*), sed laminis subsetaceis canaliculatis panicula contracta angustissima, spiculis muticis, callo brevi breviter barbato distinctus.

Gramen sine dubio perenne, circiter 4 dm. altum. *Culmi* pergraciles, erecti, simplices, 3-nodi, internodio summo solo exserto. *Foliorum* vaginae basales exteriores haud visae, caeterae teretes, nervoso-striatae, infima dorso, imprimis versus margines, et ad os pilosa, superiores glabrae, laeves, summa lamina destituta; ligulae ad marginem ciliolatum reductae; laminae subsetaceae, lateraliter leviter compressae, ad 20 cm. longae, ad 0·75 mm.

latae, canaliculatae, versus ligulam pilosae, praeter apicem scaberulum laeves, nervoso-striatae. *Panicula* angustissima contracta, ad 9 cm. longa, rhachi gracili apice paulo incrassata albo-ciliolata, ramis glabris laevibusque ad nodos solitariis vel interdum 3-4-tim verticillatis tenuiter filiformibus 5-20 mm. longis erectis; pedicelli filiformes, glaberrimi, ad 4·5 mm. longi. *Spicula* sessilis, lineari-lanceolata, acuminata, pallida, glabra, 8 mm. longa; callus perbrevis, obtusus, barbatus, pilis antice ad 2 mm. longis. *Glumae* aequales, inferior versus margines a medio sursum aculeolata, dorso praeter apicem scabrum laevissima, nervis intracarinalibus circiter 5 tenuissimis, extracarinalibus 2; superior in carina superne aspera, nervis 6-7, margine ciliata. *Valva* anthoecii inferioris 6-7 mm. longa, 2-nervis, reverse ciliata, superioris explanata elliptico- lanceolata, acuta, 4-5 mm. longa, mutica, ultra medium tenuissime 3-nervis, abhinc nervo unico incrassato purcursa; valvula phyllis 2 ad basin lineari-oblongis ciliatis 2-5 mm. longis, 1-nervibus substituta (an normalis?). *Lodiculae* late cuneatae. *Antherae*? *Spiculae* pedicellatae pallidae, anguste lanceolatae, acutae, 8 mm. longae. *Glumae* aequales, glabrae, inferior circiter 11-, superior 3-nerved. *Valva* inferior 6 mm., superior 5 mm. longa, haece tota hyalina 3-nervis. *Antherae* 2·5 mm. longae.

North Australia. Port Darwin, *Schultz* 661.

The replacement of the valvule by two 1-nerved phylla is very unusual, and suggests some anomaly in the development of the spikelets. These appear, however, perfectly healthy in every respect and are of the usual Chrysopogon type, except for the absence of an awn in the upper floret, whose valve is moreover chartaceous over a narrow portion of the back. Even if these peculiarities of the sessile spikelets should prove to be anomalous, the structure of the leaf-blades alone would be sufficient to distinguish this species from all the other species of the Gryllus type.

XIII.—NOTES ON THE EFFECTS OF SHELL FIRE ON TREES IN WOODS IN FRANCE.

We have received from Lieut. T. H. Parsons, Curator of the Royal Botanic Gardens, Peradeniya, Ceylon, who has been serving with H.M. Forces in France, the following account embodying his observations on the effect of shell fire on trees. Three of the photographs, taken by him, showing the destruction are here reproduced.

The following are a few notes obtained on the devastating effect of shrapnel on tree life, from observations made during a short period spent on forestry operations at Manancourt, north of Peronne, in Vaux, and in the St. Pierre Vaast Woods.

The notes refer chiefly to the former wood.

Owing to the poor soil, none of the trees had attained very large dimensions and they consisted chiefly of Beech, Ash, Poplar, Silver Birch, Oak, Cherry and Hornbeam.

As the whole wood was subjected to a fair amount of overhead shell fire, the different effects on the various types of tree could be observed and compared. The Silver Birch and Poplar showed the most adverse, the Beech the least adverse, effects under similar damage by exploding shells.

The photograph (Plate VI.) obtained of the Beech (*Fagus sylvatica*) indicates to some extent the small amount of damage done to it in spite of the fact that the whole trunk of the tree was most generously peppered with shrapnel fragments.

Most of the injuries appeared to have been inflicted on the tree during 1915-16, and but little effect on its vitality was to be seen.

The bark renewal of the tree was extremely rapid. The base of the trunk of this tree was also badly damaged, due, presumably, to horses having been tethered close by at a recent date.

The whole of the Beeches throughout the wood showed similar powers of recovery after being considerably damaged.

Similar injuries inflicted on the Ash (*Fraxinus excelsior*) invariably resulted in the injured branches dying off, but generally the trees made a good recovery afterwards. In a few instances, however, the more seriously injured trees lost the greater part of the head, but showed signs of growing again below the injured part, as seen in Plate VII., fig 2.

As the injuries in the latter case were sustained during the spring and summer of 1918, it has still to be seen whether the pollard growth will continue in subsequent seasons or whether such growth was due merely to utilisation of the reserve materials in the tree.

The Poplars, white and Lombardy (*Populus alba* and *P. nigra* var. *pyramidalis*), invariably died under the effects of even a moderate amount of overhead shell fire, and this was particularly noticeable among the roadside trees.

The Silver Birch (*Betula alba*) similarly succumbed, and usually during the same season in which the damage was inflicted.

Oak trees throughout withstood the damage very poorly, but survived. Many that were injured in 1915-16 are still alive, but linger on in very poor condition.

The Hornbeam (*Carpinus Betulus*) also withstood shell fire very poorly and showed only faint signs of recovery. The fragments of shrapnel usually penetrated into the trunk of a tree to a depth of about 2 to 3 in., but in some instances they were as deep as 5 in. A good example of healing of a deep shrapnel wound is shown in the photograph (Plate VII., fig. 1) of an Oak tree some 18 to 20 in. in diameter. The shrapnel had here penetrated to a depth of 5 in. and a fine healthy callus had begun to develop round the edge of the injury.

The effect of shell fire on trees, therefore, does not appear to have the same adverse effect on a fairly hard wood of reasonably quick growth, such as the Beech, as it has on the softer-wooded trees of more rapid growth, such as the Poplar, or on the harder wood of slower growth such as that of the Oak.

In addition, it was observed that the trees hit most frequently were not necessarily the most seriously damaged ones, as in many cases it was not always the number of wounds that caused the



VI.

[*To face page* 232.



FIG. 1.

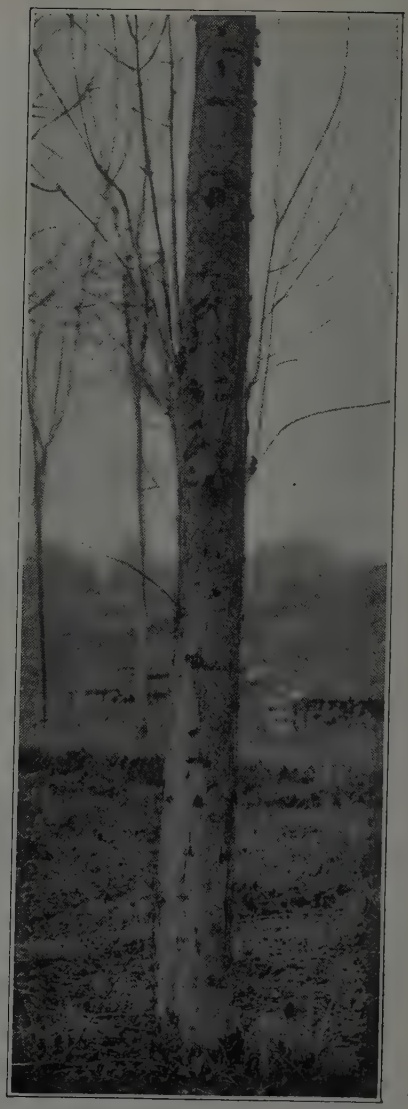


FIG. 2.

VII.

To face page 233.]

seriousness of the injuries, but rather the position of such wounds, the shrapnel fragments invariably causing the greater damage when they struck the tree in a slanting direction, causing a long, ragged wound, thus lacerating much more of the bark and cambium layer than happens when the hit is direct and clean.

Explanation of Plates.

Plate VI. A Beech tree showing the trunk deeply pitted and torn by shrapnel.

Plate VII., Fig. 1. A section of the trunk of an Oak showing a shrapnel wound 5 in. deep, around which a cork callus has begun to develop.

Fig. 2. An Ash tree. The upper part has died as a result of shell fire and pollard-like shoots are springing from the trunk below the dead portion.

XIV.—ABRAHAM'S OAK.

Quercus coccifera var. *palaestina*, Boissier.

(Syns. Q. palaestina, *Kotschy*; Q. pseudo-coccifera, *Desf.*)

W. J. Bean.

In February last, Kew received a small box of acorns from Major M. Portal, D.S.O., who was then stationed at the General Head Quarters of the British Army in Palestine. These acorns proved to be those of the Palestine form of *Quercus coccifera*, the Kermes oak, whose various forms are widely spread over South Europe, from Spain and Portugal eastwards to Asia Minor and Syria, and south of the Mediterranean in Algeria. In an accompanying letter Major Portal says:

"I send you a box full of 'Ilex' acorns from the only large clump of trees I have seen out here. It is near Kebara, about a mile on the Jerusalem side of Enab, and, according to the map, situated at an elevation of 2400 ft. This clump, some 50 yards by 30 yards, grows near the bottom of a valley and close to the ruins of an old castle reputed to date back to Crusader times. In this country it is surprising that the Turk has allowed these trees to grow to their present age and size, but there is a grave in the middle of the clump which probably may account for it. The largest tree in the clump has a trunk 9 ft. 5 in. in circumference at 3 ft. from the ground; another has a girth of 4 ft. 11 in."

It is now generally conceded that this Palestine oak, as well as some half a dozen others to which specific names have been given, are nothing more than local forms of the Kermes oak, *Q. coccifera*, a species which, though never common, has long been cultivated in English gardens. Sir Joseph Hooker pointed this out as long ago as 1861 in a well-known paper contributed to vol. xxiii. of the Transactions of the Linnean Society. He had, in the autumn of the previous year, made a short tour in Syria, in company with Mr. D. Hanbury. Although in this

paper he adopts Desfontaines' name *Q. pseudo-coccifera* for the Palestine tree, he says "how far it is permanently distinct from *Q. coccifera* of Spain and Italy may reasonably be questioned; the characters given, even if constant, amount to no more than enough to establish a variety upon."

Writing of this oak as seen by him in Palestine, he says it is "by far the most abundant tree in Syria, covering the rocky hills with a dense brushwood of trees, 8 to 12 ft. high, thickly covered with small, evergreen, rigid leaves, and bearing acorns copiously. On Mount Carmel it forms nine-tenths of the shrubby vegetation, and is almost equally abundant on the west flanks of the Anti-lebanon and many slopes and valleys of Lebanon." The infrequency of trees of large size to which Major Portal refers, was also noted by Hooker, who attributed it to the indiscriminate destruction of the Syrian forests under the Turkish regime. Probably the need for fuel was the prime cause, for even in localities where it was no longer to be seen, as in the valleys south of Bethlehem, he states that its roots were sought for in the soil, and dug up for burning.

In the brighter era which is in prospect for that country now that Turkish control has come to an end, it is to be expected that the rehabilitation of its forests will be one of the first concerns of the new government.

In comparing the forms of *Quercus coccifera* which occur at the extremes of its natural distribution, say in Spain and in Palestine, the chief difference appears to be in stature. At the western limits of its habitat it is usually a bush a few feet high, rarely a small tree, but in the East, as we see from the dimensions given by Major Portal, it is a goodly sized tree, capable of making a trunk one yard or more in diameter. The eastern form too has, in general, larger leaves and acorns. But although there is great variation in the shape and toothing, as well as in the size of the leaves, no attempt to base specific distinctions on these differences has been really successful. Hooker remarks that "not one of these characters holds good with any approach to constancy in Syria, where large and small, more or less membranous, and more or less waved and spiny leaves occur on individual plants and, more conspicuously, on adjacent ones. On Carmel, just below the convent, we gathered two forms, with interlocked branches, with the typical leaves attributed respectively to *pseudo-coccifera* and *coccifera*, but with identical acorns." The acorns, too, show great differences in size and contours. In Hooker's paper, illustrations of about twenty are given to show the range of variation. In our plate the acorns shown are comparatively broad in proportion to their length. Those in the parcel sent by Major Portal varied in length from $\frac{1}{2}$ in. to $1\frac{1}{2}$ in., but smallness does not appear to indicate any arrested development, for large and small have germinated equally well in the Arboretum nursery at Kew.

The most famous of all oaks in Palestine is the venerable tree known as "Abraham's oak," or the "Oak of Mamre." It grows at Hebron, just below the Russian Convent, which overlooks the Plain of Mamre, and is the largest known example of this


M.S.

Palestine form of *Quercus coccifera*. This tree is popularly supposed to mark the spot where grew the oak, or lentisk, under which Abraham pitched his tent, and it is on this account held sacred by Christian, Jew and Mahommedan alike. In its prime the trunk of this tree was 23 ft. in girth and the spread of its branches 90 ft. Accompanying Hooker's paper, alluded to above, is a reproduction of a drawing made by himself of this oak. He notes a curious difference in the contours of the branches on its opposite sides; on the western or Mediterranean side they are much stunted, denser and more rigid than on the eastern or inland side, where they are distinctly pendulous. Nearly thirty years after Hooker's visit to this tree, a reproduction of a photograph of it, taken by Mr. F. Skinner, of Boston, Mass., appeared in "Garden and Forest," 1889, p. 607. Some attempt at its preservation had evidently been made in the meantime, as the trunk is seen to be enclosed by a low wall, and some of its branches are propped up. But although the main outlines of the tree are very much the same as indicated in Hooker's drawing, it appears to have become much scantier of foliage and less vigorous, with the marks of age more pronounced.

In the Herbarium at Kew, there is a leafy specimen collected from Abraham's oak by Hooker and Hanbury in October, 1860, and in 1893, a block of wood from it was presented to Kew by Mrs. E. A. Finn. Mr. Finn, the husband of this lady, was British Consul at Jerusalem from 1845 to 1863. During the winter of 1856-57 there was a great snowstorm in Jerusalem, in the streets of which the snow lay deep for many days. The accumulation on Abraham's oak was so great that it broke off one of its finest branches, and it was from this branch that the block now preserved in Museum III. at Kew was cut. It is 2 ft. 10 in. long, and 1 ft. 7 in. wide. Hooker tells us that, owing to a supersition that any person who should cut or maim this oak would lose his first-born son, considerable difficulty was experienced in procuring hands to saw up the timber for transportation. When this was done it was found that the wood from this one limb was sufficient to load up seven camels.

The largest tree of which we know in the British Isles is growing in the Vicarage garden at Bitton; it is about 20 ft. high.

In the *Kew Bulletin* for 1910, p. 167, an account of *Quercus coccifera* is given, chiefly in relationship to its connection with the dye known as scarlet grain. This dye is obtained from an insect, *Coccus Ilicis*, commonly known as "Kermes," which breeds on this oak. Hooker observes, however, that he saw no Kermes in Palestine.

XV.—MISCELLANEOUS NOTES.

Mr. J. Hutchinson, Assistant for India in the Herbarium of the Royal Botanic Gardens, Kew (*K.B.*, 1915, 356), has been appointed by the President of the Board of Agriculture and Fisheries, an Assistant, Second Class, in the Royal Botanic Gardens.

Mr. Alfred Keys, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant Curator of the Botanic Station, Dominica.

Mr. H. L. R. Chapman, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Egyptian Ministry of Agriculture, on the recommendation of Kew, a Superintendent in the Horticultural Section of the Ministry.

Dr. I. B. Pole-Evans.—We learn with interest from the "Pretoria News," of May 16, that the Captain Scott Memorial Medal for Research has been awarded to Dr. I. B. Pole-Evans, Chief of the Division of Botany, Department of Agriculture, South Africa, by the South African Biological Society. This is the second award of the medal, the first award, made last year, having been to Sir Arnold Theiler, in recognition of his veterinary research.

Casimir de Candolle.*—The third generation of the celebrated de Candolle family has passed away in the person of Anne-Casimir-Pyramus de Candolle. Born at Geneva on the 20th February, 1836, Casimir de Candolle commenced his scientific studies in 1853 in the Faculty of Sciences, Paris, where he devoted himself principally to chemistry, physics and mathematics, and obtained in due course the degrees of B.èsSc. and L.èsSc.

He assisted his father, Alphonse, in editing the last two volumes of the *Prodromus*, and was joint-editor with him of the *Monographiae Phanerogamarum* which succeeded it. His first taxonomic work was a revision of the *Juglandaceae*, which appeared in the *Prodromus*, followed in 1869 by a revision of the *Piperaceae* in the same work; his interest in the latter group continued to the end of his life, and specimens of *Piperaceae* were sent to him from all parts of the world for determination. A monograph of the *Meliaceae* from his pen appeared in the *Monographiae Phanerogamarum*.

Casimir de Candolle was interested in many other departments of botany, as is shown by the wide range of his published works. His mathematical bent found expression in a series of papers on phyllotaxy. Amongst his anatomical contributions may be mentioned a memoir on the comparative anatomy of the leaf in some families of Dicotyledons, and his interest in systematic anatomy no doubt led to the inclusion in the *Monographiae Phanerogamarum* of Vesque's revision of the *Guttiferae*, in which extensive use is made of anatomical characters. His physiological work included memoirs on the effect of low temperatures on the

* Dr. J. Briquet has given a very interesting account of M. de Candolle's work in Mém. Soc. Phys. Hist. Nat. Genève, vol. xxxix. fasc. 2, pp. 89–98 (1919).

germinating power of seeds, and on the action of the ultra-violet rays in the production of flowers; and his keen interest in morphology was shown in papers on epiphyllous inflorescences and on peltate and pitcher-shaped leaves.

He upheld the family traditions in affording botanists free access to the classic Candollean herbarium and library, and the extension of the latter was the subject of his special care.

After a long and painful illness he died at Vallon, near Geneva, on the 3rd October, 1918. One of his sons, Augustin de Candolle, carries on the botanical tradition of the family in the fourth generation.

The Oil Palm.—In the Bulletin Agricole de l'Institut Scientifique de Saigon, vol. i., pp. 154–5 (May, 1919), Dr. Aug. Chevalier describes a variety of the oil palm under the name of *Elaeis guineensis*, sub-sp. *nigrescens*, var. *Poissoni*, A. Chev., about which a note (based on a specimen sent from near Calabar by Mr. W. H. Johnson) was published in the *Kew Bulletin*, 1913, pp. 92-93. It has also been named *Elaeis Poissoni* by Lieut. Annet in the Congrès d'Agriculture Coloniale de Paris, 24th May, 1918. The leading feature of this variety is the persistent fleshy perianth, which, like the seed, is rich in oil, and surrounds the fruit like a cupule. In Nigeria this variety is know as "Ayara Buvana," or "Ayara Mbana," and in French West Africa "Agode." P. Janssens in Bull. Agric. Congo Belge, ix. p. 225 (1918), states that at Mayumbe, on the lower Congo, it is called "Vuakania" and "Nagazi ya mabele," and at Ponthierville, also on the Congo, "Basatum." In Togoland and at Dahomey it bears the name "Klude" or "Klode." According to Dr. Gruner, 61 seeds of "Klude," planted in 1905, produced 51 palms, which bore "Klude" fruits, and 10 palms which bore fruits of "Dento," or the ordinary variety. C. H. W.

Strychnos Nux-vomica in Cochin China.—In *K.B.*, 1917, p. 121, a general revision of the genus *Strychnos* in India and the East was published, and on pp. 184-185, reference was made to *S. Nux-vomica* in Indo-China, and some doubt was expressed as to its occurence there in a wild state. Later on some evidence bearing upon this point was received, together with some seeds collected from wild trees in Cochin China, which conclusively proved that the species was indigenous [see *K.B.*, 1917, p. 341]. Quite recently Dr. Auguste Chevalier kindly forwarded to Kew samples of Nux-vomica seeds collected in Benhoa and Barea, Cochin China, and from Bangoi, Annam. In Bulletin Agricole de l'Institut Scientifique de Saigon, May, 1919, p. 160, Dr. Chevalier notices the earlier paper in the *K.B.*, but apparently not having seen the subsequent note [1917, p. 341], gives the following particulars of interest. *Strychnos Nux-vomica*, is one of the most characteristic trees of certain forests of Cambogia, of Cochin China (Baria, Benhoa, Thudaumot, Chaudoc, Tayninh), and of the South of Annam. In the last

country it is particularly abundant in the province of Phanthiet (Binh-tang), where Loureiro had already noted it in 1790, under the name of "Cây Cu-chi," which is still actually the Annamite name of this species in all Indo-China. The port of Bangoi exported before the war about 15 tons collected in this region, and bought by Chinese and German merchants. The Scientific Institute is taking means at the present time to recover the trade, and will make known the result later. J. M. H.

Viburnum Carlesii, var. **syringiflora.***—From about the beginning of May of this year, one of the most charming beds of flowering shrubs at Kew has been that of *Viburnum Carlesii*, by the side of a path leading from greenhouse No. 4 to the old rock garden. This beautiful Corean shrub combines with its delightful clusters of pink-white flowers a most agreeable scent, and as an indication of the "hit" this species has made on the horticultural mind, one need only turn to the pages of the gardening periodicals, where it has been frequently described and figured during the month of May for the last few years. Mr. Beckett, in the "Gardeners' Chronicle" for May 6th, 1916, p. 242, writing in praise of *V. Carlesii*, says: "Unfortunately there are two varieties in existence, one of which is much inferior to the other." This inferior variety, together with the true form, has recently been forwarded to Kew by Messrs. Robert Veitch & Son, of Exeter, with the request that the poorer form should be given a distinctive name, in order that it may be distinguished in trade. It differs from true *V. Carlesii* in its less hairy leaves, which are also probably more fully developed at the time of flowering than are those of the type, its laxes and smaller flowers with much smaller spread of corolla limb, and according to Messrs. Veitch, there is also some difference in habit. As pointed out, it is desirable that this plant should be named, and I therefore describe it here as *V. Carlesii*, var. *syringiflora*, from the general resemblance of the flowers to those of a lilac. That this plant deserves only varietal rather than specific rank seems probable, because it does not appear to have been gathered yet in a wild state. Probably Mr. E. H. Wilson, who has lately been travelling in Corea, may have met with it. J. H.

Botanical Magazine.—The following plants are figured in the number for January, February and March:—*Rhododendron auriculatum*, Hemsl. (t. 8786), from Central China; *Isabelia virginalis*, Rodr. (t. 8787), a native of Brazil; *Ipomoea dasysperma*, Jacq. (t. 8788), from Tropical Asia and Africa; *Rhododendron callimorphum*, Balf. f. & W. W. Sm. (t. 8789), from Yunnan; *Aloe concinna*, Baker (t. 8790), from Zanzibar; *Primula chasmophila*, Balf. f. (t. 8791), a native of Bhutan; *Bulbophyllum robustum*, Rolfe (t. 8792), a native of Madagascar;

* *Viburnum Carlesii*, var. *syringiflora*, Hutchinson, var. nov.; a typo foliis sub anthesin bene evolutis parce stellato-puberulis, inflorescentiis laxis, corollae limbo multo minore et habitu differt.

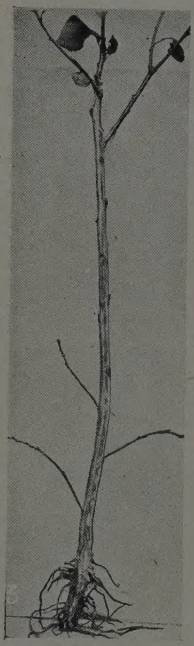
Protea longifolia, Andr. (t. 8792), from South Africa; *Govenia lagenophora*, Lindl. (t. 8794), a native of Mexico; *Deutzia compacta*, Craib (t. 8795), from China, and *Primula tibetica*, Watt (t. 8796), a native of the Eastern Himalaya and Tibet.

A Garden Flora: Nymans*.—The collection of trees and shrubs, formed by the late Mr. L. Messel at Nymans, has for many years been well known as one of the richest in rare species existing in the south of England. Mr. Messel, who died in 1915, was an ardent experimenter and made a speciality of introducing to his garden and acclimatising there reputedly tender and difficult things. Recognising the fact that many species are more particularly liable to succumb to the adversities of our climate whilst they are young and small, he built glasshouses where tender and doubtful species could be grown on with some protection until they were of a size and strength to fit them for planting in the open ground. He thereby gave them a much better chance of surviving than if they had been put out as quite small plants. Mr. Messel's successes were quite remarkable, for Nymans is situated on the Forest Ridge of Sussex and part of the garden is 500 ft. above sea-level. He was, for instance, the first to flower *Embothrium coccineum* out of doors in a garden so near to London. The present volume, a copy of which has been presented to the Kew Library, is a list of the plants grown at Nymans. Of this list the trees and shrubs constitute the most important section. It was compiled by the owner's daughter, Miss Muriel Messel, who also contributed very interesting short notes on the more remarkable species, more especially in regard to their history and behaviour at Nymans. Her work forms a valuable record and will be extremely useful as a guide to planters generally, but especially to people whose gardens are situated in localities where the climatic conditions approximate those of Nymans. It is illustrated with ten drawings of rare trees and shrubs by Mr. Alfred Parsons, R.A., and is most admirably printed on beautiful paper. Had Miss Messel lived to see the publication of her work, she could have been congratulated on producing a very pleasant and attractive, as well as useful, volume; unhappily she succumbed to an attack of influenza last December. The book is inscribed to her father's memory, but it is pleasant to feel also that it will keep in long remembrance a young and charming personality cut off in the flower of her age. W. J. B.

* A Garden Flora. Trees and Flowers grown in the gardens at Nymans by L. Messel, 1890-1915. With illustrations by Alfred Parsons. Foreword by W. Robinson. Notes by Muriel Messel. Published at the offices of "Country Life."











VIII.